PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	)
	)
Greene et al.	) Art Unit: 2628
	)
Application No. 10/658,224	) Examiner: Nguyen, Phu K.
	)
Filed: 09/08/2003	) Date: March 19, 2007
	)
For: SYSTEM, METHOD AND COMPUTER PROGRAM PRODUCT FOR UPDATING A FAR CLIPPING PLANE IN ASSOCIATION WITH A HIERARCHICAL DEPTH BUFFER	)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

ATTENTION: Board of Patent Appeals and Interferences

REPLY BRIEF (37 C.F.R. § 41.37)

This Reply Brief is being filed within two (2) months of the mailing of the Examiner's Answer mailed on 01/17/2007.

Following is an issue-by-issue reply to the Examiner's Answer.

Issue #1:

The Examiner has rejected Claims 1-3, 6-9, 12-14, 16-19, and 22-24 under 35 U.S.C. 103(a) as being unpatentable over Greene et al. ("Hierarchical Z-buffer Visibility") in view of Dehmlow et al. (U.S. Patent No. 5,999,187).

Group #1: Claims 1-3, 6-9, 12-14, and 17-19

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on appellant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed.Cir.1991).

With respect to the first element of the *prima facie* case of obviousness and, in particular, the obviousness of combining the aforementioned references, the Examiner has argued that it would have been obvious to update the far clipping plane because it improves the z-buffer resolution and accuracy of graphics selection. To the contrary, appellant respectfully asserts that it would not have been obvious to combine the teachings of the Greene and Dehmlow references, especially in view of the vast evidence to the contrary.

Specifically, Dehmlow relates to a computer aided design (CAD) system, while Greene relates to a visibility algorithm. To simply glean features from a CAD system, which aids in the creation and display of objects on a computer (such as in Dehmlow), and combine the same with the *non-analogous art* of visibility algorithms (such as in Greene), would simply be improper. "In order to rely on a reference as a basis for rejection of an appellant's invention, the reference must either be in the field of appellant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." In re Oetiker, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992). See also In re Deminski, 796 F.2d 436, 230 USPQ 313

(Fed. Cir. 1986); In re Clay, 966 F.2d 656, 659, 23 USPQ2d 1058, 1060-61 (Fed. Cir. 1992). In view of the vastly different types of problems a CAD system addresses as opposed to a visibility algorithm, the Examiner's proposed combination is inappropriate.

In the Advisory Action mailed 12/09/2005, the Examiner, in response, has argued that "[Dehmlow] uses [an] image visibility technique for displaying images on his CAD system, so he teaches the area of image visibility algorithm as claimed." Appellant respectfully disagrees, as it appears that the Examiner has simply generalized his description of the art of Dehmlow to the point that it becomes analogous with that of Greene. Appellant respectfully disagrees with this approach, since, if a relevant description is broadened sufficiently, any and all arts are analogous to some extent.

In the Examiner's Answer mailed 01/17/2007, the Examiner has argued that "Greene's visibility algorithm is perfectly compatible for use in [Dehmlow's] system as following: Greene renders the object for its visibility by checking whether the hierarchical octree cubes, which encloses the object or its primitives, intersects the viewing frustum (Greene, page 3, column 1, lines 11-29), whereas [Dehmlow] uses the same viewing frustum 714 for visibility or culling/clipping processes ([Dehmlow], column 11, lines 7-25)" and "[t]herefore, [Dehmlow's] octree database structure is analogous to Appellant's hierarchical z-buffer."

Appellant respectfully disagrees, and asserts that Dehmlow discloses that "[t]he octree representation may be thought of as a hierarchy of nested cells or cubes" where "[e]ach cell has 8 internal child cells whose sides are half the length of the corresponding side of the parent cells" (Col. 4, lines 55-58 – emphasis added). Additionally, Dehmlow discloses that "in each octree level or each increasing level of granularity, a finer level of detail of an object can be achieved" (Col. 5, lines 27-29 – emphasis added). However, Greene suggests "combin[ing] Z buffering with an octree spatial subdivision" such that "if we scan convert the faces of an octree cube and find that each pixel of the cube is behind the current surface in the Z buffer, we can safely ignore all the geometry contained in that cube" (Page 3, Section 3.1, Paragraph 1 – emphasis added). Clearly, Dehmlow's suggestion of an octree containing multiple levels of detail is simply *non-analogous* to Greene's octree spatial subdivision combined with a Z buffer. Thus, the Examiner's proposed combination is inappropriate.

Additionally, in the Examiner's Answer mailed 01/17/2007, the Examiner references Col. 12, lines 49-53 of Dehmlow and asserts that it "would have been obvious to update the far clipping plane because it reduces the amount of processed data and improves the render speed and the accuracy of the graphics selection mechanism." Appellant respectfully disagrees and again notes that the disclosure in Dehmlow is simply non-analogous to that taught in Greene, as explained above.

More importantly, with respect to the third element of the *prima facie* case of obviousness, the Examiner has not even addressed appellant's previously amended claim language, as set forth below:

"...said system comprising means for updating said far clipping plane based on the farthest depth value in a z-pyramid, <u>if the farthest depth value in the z-pyramid is nearer than a depth of the far clipping plane</u>" (emphasis added - see the same or similar, but not necessarily identical language in each of the independent claims).

Further, in the Office Action mailed 10/06/2005, the Examiner merely points to Page 2, Col. 2 to Page 3, Col. 1 (Section 3.1) from Greene to make a prior art showing of appellant's claimed "z-pyramid." Appellant contends, however, that the mere mention of a "z-pyramid" in Greene in no way meets appellant's claimed functionality surrounding a z-pyramid, namely, <u>updating a far clipping plane based on the farthest depth value</u> in a z-pyramid, <u>if the farthest depth value in the z-pyramid is nearer than a depth of the far clipping plane</u>, as claimed.

Appellant respectfully asserts that neither the Greene nor Dehmlow reference teach that the far clipping plane is updated substantially based on a farthest depth value which is included in a z-pyramid, in the manner claimed by appellant. In fact, Dehmlow teaches that "far clipping planes are positioned dynamically based on the part(s)...that are present within the five-point view frustum boundary 714" (see Col. 12, lines 43-46). Clearly, simply suggesting that a far clipping plane be within a five-point view frustum boundary, as in Dehmlow, does not meet and even *teaches away* from a farthest depth value included in a <u>z-pyramid</u>, in the manner claimed by appellant.

Still yet, as mentioned hereinabove, the Examiner has failed to make a prior art showing of appellant's claimed condition upon which the claimed updating is based, namely <u>if the farthest depth value in the z-pyramid is nearer than a depth of the far clipping plane</u>, as claimed. Only appellant teaches and claims a far clipping plane that is updated substantially based on a farthest depth value in a z-pyramid conditionally upon the aforementioned specific criteria associated with the z-pyramid.

In the Advisory Action mailed 12/09/2005, the Examiner, in response, has argued that "[Dehmlow's] update of the far clipping plane on zbuffer and Green's z-pyramid can be combine[d] to yield the update of the far clipping plane on a value of a pyramid z-buffer." Again, appellant respectfully disagrees, as this argument appears to be redundant with respect to those set forth in the Office Action mailed 10/06/2005. Again, for the reasons set forth above, appellant finds it improper for the Examiner to support his rejection by simply pointing to the disclosure of a "z-pyramid" <u>in a vacuum</u> in Greene, and the disclosure in Dehmlow <u>merely</u> suggesting that a far clipping plane be within a five-point view frustum boundary. These two disclosures, when combined, do <u>not</u> together meet appellant's claim language (particularly the functional language noted above).

In the Examiner's Answer mailed 01/17/2007, the Examiner has argued that '"the near and far clipping planes are positioned dynamically based on the part(s) (i.e., the cells that have non-null cell-to-art mapping) that are present within the five-point view frustum boundary 714 (column 12, lines 43-46)"; which means the updates of the close and far clipping planes 715e and 715f are based on the cells that have non-null cell-to-art mapping.' Further, the Examiner has argued that '[Dehmlow] states "the farthest point on the farthest cell (again with a non-null cell-to-art mapping) is used to position the far clipping plane" (column 12, lines 61-63); which means "whenever the farthest depth value does not match (i.e., nearer or farther) the current position of the far clipping plane, the far clipping plane will be updated to the farthest depth value."'

Appellant respectfully disagrees and asserts that Dehmlow discloses that "[p]referably a cell-to-part mapping is performed 328, i.e., for each cell, <u>a list of those parts that reside or intersect that cell is formed</u>" and that "this mapping is performed for only <u>a single octree hierarchy level</u>, (e.g.,

level 5 in a 7-level system)" (Col. 8, lines 16-20 – emphasis added). Further, Dehmlow discloses that "[i]f a part intersects more than one cell it will be referenced in the cell-to-part mapping for each cell" and that "[i]f view frustum culling identifies cells at a different level from that of the cell-to-part mapping, the octree data representation is traversed (as discussed below) to collect the list of parts from the cell-to-part mapping" (Col. 8, lines 33-38 – emphasis added). In addition, Dehmlow discloses that "the near and far clipping planes are positioned dynamically based on the part(s) (i.e. the cells that have non-null cell-to-art mappings) that are present within the five-point view frustum boundary 714" and "[t]he near and far clipping planes are positioned as close to the part(s) as possible without actually clipping any of the part(s) from the resulting image that is generated" (Col. 12, lines 43-49 – emphasis added). Furthermore, Dehmlow discloses that "the farthest point on the farthest cell (again with a non-null cell-to-part mapping) is used to position the far clipping plane" (Col. 12, lines 61-63 – emphasis added).

However, the mere disclosure that a list of parts that reside or intersect that cell is formed and referenced in the cell-to-part mapping for the cell, and that the far clipping plane is positioned based on the parts that are present within the five-point view frustum boundary, as in Dehmlow, simply fails to suggest "a far clipping plane that is capable of being updated substantially based on a farthest depth value in a z-pyramid, if the farthest depth value in the z-pyramid is nearer than a depth of the far clipping plane" (emphasis added), as claimed by appellant. Clearly, updating the far clipping plane based on the farthest point on the farthest cell with a non-null cell-to-part mapping based on the octree data representation, as in Dehmlow, simply fails to suggest "a far clipping plane that is capable of being updated substantially based on a farthest depth value in a z-pyramid" (emphasis added), in the manner as claimed by appellant.

Further, in the Examiner's Answer mailed 01/17/2007, the Examiner has argued that 'in a special case of one-level Z_pyramid (the claimed language does not limit the size of the claimed Z-pyramid), Greene's hierarchical z-buffer system becomes an octree system as in case of [Dehmlow] (Greene, page 5, column 1, lines 14-16 of section 4.1, "...[such] that if we shrink the window size down to a single pixel, the hierarchical visibility algorithm becomes a ray caster using an octree subdivision").' Further, the Examiner has argued that '[i]n this special case, not only [is] Greene's hierarchical z-buffer system... analogous to [Dehmlow's] hierarchical octree system, but also their dynamically updated viewing frustum is "updating said far clipping plane

based on the farthest depth value, if the farthest depth value is nearer than a depth of the far clipping plane."'

Appellant respectfully disagrees and asserts that Greene discloses that "[t]he basic idea of the Z pyramid is to use the original Z buffer as the finest level in the pyramid and then combine four Z values at each level into one Z value at the next coarser level by choosing the farthest Z from the observer" (Page 3, Section 3.2, Paragraph 2 – emphasis added). Further, Greene discloses that "[e]very entry in the pyramid therefore represents the farthest Z for a square area of the Z buffer" and "[a]t the coarsest level of the pyramid there is a single Z value which is the farthest Z from the observer in the whole image" (Page 3, Section 3.2, Paragraph 2 – emphasis added).

Clearly, Greene discloses that a Z pyramid uses the original Z buffer at the finest level, and then combines four Z values at each level into one Z value at the next coarser level, which simply does not support the Examiner's assertion of "a special case of one-level Z_pyramid." Further, Greene discloses that at the coarsest level of the pyramid there is a single Z value that is the farthest Z value from the observer in the whole image, which simply fails to support the Examiner's assertion of "a special case of one-level Z_pyramid."

Furthermore, in the Examiner's Answer mailed 01/17/2007, the Examiner has argued "...that if we shrink the window size down to a single pixel, the hierarchical visibility algorithm becomes a ray caster using an octree subdivision" where '[i]n this special case, not only [is] Greene's hierarchical z-buffer system... analogous to [Dehmlow's] hierarchical octree system, but also their dynamically updated viewing frustum is "updating said far clipping plane based on the farthest depth value, if the farthest depth value is nearer than a depth of the far clipping plane."'

Appellant respectfully disagrees and asserts that Greene merely discloses that "[t]he hierarchical Z-buffer visibility algorithm uses an octree spatial subdivision to exploit object-space coherence, a Z pyramid to exploit image-space coherence, and a list of previously visible octree nodes to exploit temporal coherence" (Page 2, Section 3, Paragraph 1 – emphasis added). In addition, Greene discloses that "[w]e have made our hierarchical visibility implementation capable of dividing the image into a grid of smaller windows, rendering them individually and compositing them into a final image" and that "if we shrink the window size down to a single pixel, the

<u>hierarchical visibility algorithm becomes a ray caster using an octree subdivision</u>" (Page 5, Section 4.1, Paragraph 1 – emphasis added). Additionally, Greene discloses that "[t]he algorithm can, for example, <u>render a **32 by 32 region** for only slightly **more than four times** the computational expense of **ray-casting a single pixel**</u> with this algorithm" and in "[c]omparing the <u>single pixel window</u> time to the time for <u>the whole image</u>, we find that <u>**image-space coherence is responsible for a factor of almost 300 in running time**</u> for this example" (Page 5, Section 4.1, Paragraph 2 – emphasis added).

Thus, Greene suggests using <u>**a Z pyramid to exploit the image-space coherence**</u>, where if the image is divided into a grid of 32 by 32 windows, the computational expense is <u>only slightly more than four times the computational expense of ray-casting a single pixel of window</u>, and that the <u>image-space coherence</u> is responsible for a factor of almost 300 in running time when <u>the single pixel window</u> time is compared to the time for <u>the whole image</u>. Clearly, the improved running time due to the image-space coherence of the Z-pyramid for 32 by 32 or larger windows *teaches away* from using a window size of a single pixel due to the computational savings of a 32 by 32 window size due to image-space coherence. Therefore, Greene fails to support the Examiner's argument for the special case Z pyramid case being analogous to Dehmlow's hierarchical octree system.

Appellant respectfully asserts that at least the first and third elements of the *prima facie* case of obviousness have not been met, since it would be *unobvious* to combine the references, as noted above, and the prior art references, as relied upon by the Examiner, fail to teach or suggest <u>all</u> of the claim limitations, as noted above.

Group #2: Claim 16

With respect to Claim 16, the Examiner has relied on the following excerpts from Dehmlow to make a prior art showing of appellant's claimed technique "wherein the updating includes resetting the far clipping plane to the farthest depth value."

> "In another embodiment the near and far clipping planes are positioned dynamically based on the part(s) (i.e. the cells that have non-null cell-to-art mappings) that are present within the five-point view frustum boundary 714. The near and far clipping planes are positioned

> as close to the part(s) as possible without actually clipping any of the part(s) from the resulting image that is generated. This clip plane "clamping" reduces the distance between the clipping planes and improves the z-buffer resolution of the graphics system. This is turn improves the accuracy of the graphics selection mechanism. Furthermore, surfaces that are close together are displayed more precisely (with respect to how the surfaces occlude each other). The actual position of the clipping planes is determined after the cells have been sorted in order of distance from the virtual camera and before any primitives are sent to the graphics system for rendering. The closest point on the closest cell (with a non-null cell-to-part mapping) to the virtual camera is used to position the near clipping plane. In a similar fashion, the farthest point on the farthest cell (again with a non-null cell-to-part mapping) is used to position the far clipping plane. Since the cells are already sorted for the subsequent scene processing, this procedure can be used at interactive frame rates." (Col. 12, lines 49-53)

Appellant respectfully disagrees, as the Examiner has not taken the forgoing claim language of Claim 16 into context. Specifically, the claimed "farthest depth value" is specifically included <u>in a z-pyramid</u>, as set forth in intervening Claim 1.

In the Examiner's Answer mailed 01/17/2007, the Examiner has argued that '"the near and far clipping planes are positioned dynamically based on the part(s) (i.e., the cells that have non-null cell-to-art mapping) that are present within the five-point view frustum boundary 714 (column 12, lines 43-46)"; which means the updates of the close and far clipping planes 715e and 715f are based on the cells that have non-null cell-to-art mapping.' Further, the Examiner has argued that '[Dehmlow] states "the farthest point on the farthest cell (again with a non-null cell-to-art mapping) is used to position the far clipping plane" (column 12, lines 61-63); which means "whenever the farthest depth value does not match (i.e., nearer or farther) the current position of the far clipping plane, the far clipping plane will be updated to the farthest depth value."'

Appellant respectfully disagrees and asserts that Dehmlow discloses that "[p]referably a cell-to-part mapping is performed 328, i.e., for each cell, <u>a list of those parts that reside or intersect that cell is formed</u>" and that "this mapping is performed for only <u>a single octree hierarchy level</u>, (e.g., level 5 in a 7-level system)" (Col. 8, lines 16-20 – emphasis added). Further, Dehmlow discloses that "[i]f a part intersects more than one cell it <u>will be referenced in the cell-to-part mapping for each cell</u>" and that "[i]f view frustum culling identifies cells at a different level from that of the cell-to-part mapping, the octree data representation is traversed (as discussed below) to collect the list of parts from the cell-to-part mapping" (Col. 8, lines 33-38 – emphasis added). In

addition, Dehmlow discloses that "the near and far clipping planes are positioned dynamically based on the part(s) (i.e. the cells that have non-null cell-to-art mappings) that are present within the five-point view frustum boundary 714" and "[t]he near and far clipping planes are positioned as close to the part(s) as possible without actually clipping any of the part(s) from the resulting image that is generated" (Col. 12, lines 43-49 – emphasis added). Furthermore, Dehmlow discloses that "the farthest point on the farthest cell (again with a non-null cell-to-part mapping) is used to position the far clipping plane" (Col. 12, lines 61-63 – emphasis added).

However, merely disclosing that a list of parts that reside or intersect a cell is formed and referenced in the cell-to-part mapping for the cell, and that the far clipping plane is positioned based on the parts that are present within the five-point view frustum boundary, as in Dehmlow, simply fails to suggest a technique "wherein the updating includes resetting the far clipping plane to the farthest depth value," where the updating is "substantially based on a farthest depth value in a z-pyramid" (emphasis added), in the context as claimed by appellant. Clearly, updating the far clipping plane based on the farthest point on the farthest cell with a non-null cell-to-part mapping based on the octree data representation, as in Dehmlow, simply fails to suggest resetting the far clipping plane "based on a farthest depth value in a z-pyramid" (emphasis added), in the context as claimed by appellant.

Further, in the Examiner's Answer mailed 01/17/2007, the Examiner has argued that 'in a special case of one-level Z_pyramid (the claimed language does not limit the size of the claimed Z-pyramid), Greene's hierarchical z-buffer system becomes an octree system as in case of [Dehmlow] (Greene, page 5, column 1, lines 14-16 of section 4.1, "...[such] that if we shrink the window size down to a single pixel, the hierarchical visibility algorithm becomes a ray caster using an octree subdivision").' Further, the Examiner has argued that '[i]n this special case, not only [is] Greene's hierarchical z-buffer system... analogous to [Dehmlow's] hierarchical octree system, but also their dynamically updated viewing frustum is "updating said far clipping plane based on the farthest depth value, if the farthest depth value is nearer than a depth of the far clipping plane."'

Appellant respectfully disagrees and asserts that Greene discloses that "[t]he basic idea of the Z pyramid is to use the original Z buffer as the finest level in the pyramid and then combine four Z

values at each level into one Z value at the next coarser level by choosing the farthest Z from the observer" (Page 3, Section 3.2, Paragraph 2 – emphasis added). Further, Greene discloses that "[e]very entry in the pyramid therefore represents the farthest Z for a square area of the Z buffer" and "[a]t the coarsest level of the pyramid there is a single Z value which is the farthest Z from the observer in the whole image" (Page 3, Section 3.2, Paragraph 2 – emphasis added).

Clearly, Greene discloses that a Z pyramid uses the original Z buffer at the finest level, and then combines four Z values at each level into one Z value at the next coarser level, which simply does not support the Examiner's assertion of "a special case of one-level Z_pyramid." Further, Greene discloses that at the coarsest level of the pyramid there is a single Z value that is the farthest Z value from the observer in the whole image, which simply fails to support the Examiner's assertion of "a special case of one-level Z_pyramid."

Furthermore, in the Examiner's Answer mailed 01/17/2007, the Examiner has argued "...that if we shrink the window size down to a single pixel, the hierarchical visibility algorithm becomes a ray caster using an octree subdivision" where '[i]n this special case, not only [is] Greene's hierarchical z-buffer system... analogous to [Dehmlow's] hierarchical octree system, but also their dynamically updated viewing frustum is "updating said far clipping plane based on the farthest depth value, if the farthest depth value is nearer than a depth of the far clipping plane."'

Appellant respectfully disagrees and asserts that Greene merely discloses that "[t]he hierarchical Z-buffer visibility algorithm uses an octree spatial subdivision to exploit object-space coherence, a Z pyramid to exploit image-space coherence, and a list of previously visible octree nodes to exploit temporal coherence" (Page 2, Section 3, Paragraph 1 – emphasis added). In addition, Greene discloses that "[w]e have made our hierarchical visibility implementation capable of dividing the image into a grid of smaller windows, rendering them individually and compositing them into a final image" and that "if we shrink the window size down to a single pixel, the hierarchical visibility algorithm becomes a ray caster using an octree subdivision" (Page 5, Section 4.1, Paragraph 1 – emphasis added). Additionally, Greene discloses that "[t]he algorithm can, for example, render a **32 by 32 region** for only slightly **more than four times** the computational expense of **ray-casting a single pixel** with this algorithm" and in "[c]omparing the single pixel window time to the time for the whole image, we find that **image-space**

<u>coherence is responsible for a factor of almost 300 in running time</u> for this example" (Page 5, Section 4.1, Paragraph 2 – emphasis added).

Thus, Greene suggests using **<u>a Z pyramid to exploit the image-space coherence</u>**, where if the image is divided into a grid of 32 by 32 windows, the computational expense is <u>only slightly more than four times the computational expense of ray-casting a single pixel of window</u>, and that the <u>image-space coherence</u> is responsible for a factor of almost 300 in running time when <u>the single pixel window</u> time is compared to the time for <u>the whole image</u>. Clearly, the improved running time due to the image-space coherence of the Z-pyramid for 32 by 32 or larger windows *teaches away* from using a window size of a single pixel due to the computational savings of a 32 by 32 window size due to image-space coherence. Therefore, Greene fails to support the Examiner's argument for the special case Z pyramid case being analogous to Dehmlow's hierarchical octree system.

Again, appellant respectfully asserts that at least the first and third elements of the *prima facie* case of obviousness have not been met, since it would be *unobvious* to combine the references, as noted above, and the prior art references, as relied upon by the Examiner, fail to teach or suggest <u>all</u> of the claim limitations, as noted above.

Group #3: Claim 20

In the Examiner's Answer mailed 01/17/2007, the Examiner has agreed with appellant's arguments, and has indicated allowable subject matter in Claim 20. Further, the Examiner has stated that Claim 20 would be allowable if rewritten in independent form. Appellant thanks the Examiner for the allowable subject matter of Claim 20.

Group #4: Claim 21

In the Examiner's Answer mailed 01/17/2007, the Examiner has agreed with appellant's arguments, and has indicated allowable subject matter in Claim 21. Further, the Examiner has stated that Claim 21 would be allowable if rewritten in independent form. Appellant thanks the Examiner for the allowable subject matter of Claim 21.

Group #5: Claims 22-23

Still yet, the Examiner has merely dismissed the following subject matter of Claims 22-23 as being well known in the art: "wherein depth values of the z-pyramid are encoded" (see Claim 22), and "wherein the depth values of the z-pyramid are encoded for reducing storage requirements thereof" (see Claim 23). Appellant respectfully disagrees, as only appellant teaches and claims such encoding in the specific context of depth values of the z-pyramid, in the context claimed, for improved updating and/or related processing.

Thus, with respect to Claims 22-23, it appears that the Examiner has simply dismissed the same under Official Notice. In response, appellant again points out the remarks above that clearly show the manner in which some of such claims further distinguish the prior art references of record. Appellant thus formally requests a specific showing of the subject matter in ALL of the claims in any future action. Note excerpt from MPEP below.

> "If the appellant traverses such an [Official Notice] assertion the examiner should cite a reference in support of his or her position." See MPEP 2144.03.

In the Examiner's Answer mailed 01/17/2007, the Examiner has argued that "[Dehmlow] teaches the encoding of depth values to save storage requirements for Z-values ([Dehmlow], 3D run length encoded format or different formats; column 7, lines 11-12, or 51-56)."

Appellant respectfully disagrees and asserts that Dehmlow merely discloses that "cell intersections are represented in a 3-D run length encoded (3DRLE) format" (Col. 7, lines 11-13 – emphasis added). Further, Dehmlow discloses that "[t]he <u>intersection results</u> from the procedure of FIG. 4 are stored in a temporary structure such as a data array (so-called 3-D array) containing <u>the marked state of each cell</u> 512" and that '[t]he temporary data structure is traversed, e.g., in the left-to-right, back-to-front, top-to-bottom manner, until an "on" cell is found 514' (Col. 7, lines 26-31 – emphasis added). In addition, Dehmlow discloses that "[o]nce <u>an on cell is found</u>, the data is examined to find the longest contiguous run of cells in each direction (i, j, k) that

results in a volume with rectangular sides 516" where "[t]he corners of this volume are stored as a proposed RLE value" (Col. 7, lines 31-35 – emphasis added).

However, the mere disclosure that cell intersections are represented in 3-D run length encoded format, where intersection results are stored and traversed to find a contiguous run of on cells that result in a volume with rectangular sides whose corners are stored as a RLE value, as in Dehmlow, simply fails to even suggest a technique "wherein depth values of the z-pyramid are encoded" (emphasis added), in the manner as claimed by appellant. Clearly, the 3-D run length encoded cell intersection results, as in Dehmlow, simply fails to suggest that the "depth values of the z-pyramid are encoded" (emphasis added), in the manner as claimed by appellant.

Again, appellant respectfully asserts that at least the first and third elements of the *prima facie* case of obviousness have not been met, since it would be *unobvious* to combine the references, as noted above, and the prior art references, as relied upon by the Examiner, fail to teach or suggest all of the claim limitations, as noted above.

Group #6: Claim 24

With respect to Claim 24, the Examiner has relied on Col. 12, lines 43-53 from Dehmlow and Page 3, Col. 1 from Greene to meet appellant's claimed technique "wherein the updating accelerates a culling of a box since a depth of a nearest corner of the box is farther than the farthest depth value." Appellant respectfully disagrees, as the mere mention of culling in Greene does not rise to the level of specificity of the culling "of a box," as claimed. Further, neither of the references makes any mention of updating a far clipping plane based on the farthest depth value in a z-pyramid for the specific purpose of accelerating the culling of a box specifically due to the fact that a depth of a nearest corner of the box is farther than the farthest depth value.

In the Examiner's Answer mailed 01/17/2007, the Examiner has argued that "[Dehmlow's] octree box is used in the comparison of the viewing frustum (column 11, lines 15-19) in which the culling process accelerates in case... the octree box is outside the viewing frustum when a depth of the nearest corner of the box is farther [than] the farthest depth value."

Appellant respectfully disagrees and asserts that Dehmlow merely discloses that 'in the situation depicted in FIG. 7, the scene can be adequately rendered by rendering only those parts (either in full detail or in simplified fashion) which lie within the frustum 714 and "culling" volumes outside that cone 714' (Col. 11, lines 15-19 - emphasis added). However, the mere disclosure of only rendering the parts that lie within the frustum and culling volumes outside the cone, as in Dehmlow, simply fails to even suggest a technique "wherein the updating accelerates a culling of a box since a depth of a nearest corner of the box is farther than the farthest depth value," where "a far clipping plane that is capable of being updated substantially based on a farthest depth value in a z-pyramid" (emphasis added), in the context as claimed by appellant. Clearly, merely disclosing culling parts outside the frustum, as in Dehmlow, fails to suggest culling of a box, in the manner as claimed by appellant.

Again, appellant respectfully asserts that at least the first and third elements of the *prima facie* case of obviousness have not been met, since it would be *unobvious* to combine the references, as noted above, and the prior art references, as relied upon by the Examiner, fail to teach or suggest all of the claim limitations, as noted above.

In view of the remarks set forth hereinabove, all of the independent claims are deemed allowable, along with any claims depending therefrom.

In the event a telephone conversation would expedite the prosecution of this application, the Examiner may reach the undersigned at (408) 971-2573. For payment of any additional fees due in connection with the filing of this paper, the Commissioner is authorized to charge such fees to Deposit Account No. 50-1351 (Order No. NVIDP224B).

Respectfully submitted,

By: /KEVINZILKA/ Date: March 19, 2007

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